
**COPEES-VULCAN
INSTALLATION OF CONTROL VALVES
- GUIDANCE NOTES -**

1.0 INTRODUCTION

Unlike conventional pipeline valves, control valves operate with relatively close tolerance fittings and with operating forces closely matched to those required to operate the valve. To achieve satisfactory control valve operation, correct installation of the valve is essential.

The installation recommendations in this document are based on experience and good piping practice. If followed, these guidelines should result in trouble-free commissioning of the control valve and will greatly aid in avoiding operational problems in the future.

2.0 PRIOR TO DELIVERY

After your order is entered, you will receive a copy of the certified Copes-Vulcan Valve Data Specification Sheet, detailing the operating conditions for which the equipment is being designed, along with drawings illustrating the equipment we propose to supply. This information should be reviewed carefully to confirm that our interpretation of your requirements is correct. Any discrepancies should be pointed out immediately to Copes-Vulcan.

This document and the drawings illustrating the equipment should be forwarded to the person(s) responsible for locating the control valve and for designing the associated piping. These recommendations must be followed to achieve a satisfactory installation.

The Copes-Vulcan Valve Data Specification Sheet for the as-built valve will be included in the Copes-Vulcan Installation, Operation and Maintenance Instruction Manual supplied for the order.

3.0 ON RECEIPT

On receipt, the valve should be inspected to ensure that no damage has been sustained in transit. A packing list containing a complete description of the valve and its accessories accompanies each valve. Check the list against the equipment that has been supplied. Report any problems to Copes-Vulcan.

4.0 PROVISIONS FOR PROPER STORAGE

If the valve is not being installed immediately upon receipt, the points below should be considered when placing the equipment into storage. Regular inspections of the stored valve should be made, as detailed in Section 5.

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A. Location During Storage

If possible, the valve should be stored indoors in a ventilated area in its original shipping container. If indoor storage is not possible, the equipment should not be stored in contact with the ground.

B. Use of Desiccants

When desiccant bags are supplied in carbon steel valves, a tag will be attached to an outside surface of the valve identifying the number of bags, their location, and the trade name of the desiccant. The desiccant bags are to be replaced every three months while the valve is stored.

C. Protection from Rust

Unpainted metal surfaces may be protected from rust by applying a rust preventive compound such as CRC 3-36 or equivalent.

Valve end covers should be removed and a film of rust preventive compound should be sprayed on the valve internals and on the inside surface of the body. The ends should then be securely re-sealed. NOTE: Before performing this procedure, make sure that any substance used for this purpose will not be detrimental to the fluid to be passed through the installed valve.

Where needed, the above treatments should be applied annually.

When a rust preventive compound is not permissible or cannot be used, the equipment must be enclosed in a vapor-proof envelope, evacuated of all air, and sealed.

D. Treatment of Electric Contacts on Limitorque Motor Operators

Valves with Limitorque actuators that are to be stored for periods longer than one year require maintenance of the electric contacts located in the limit switch compartment as follows:

When storing for one to two years maximum, spray all electric contacts with CRC 2-26 or equivalent. This preservative does not have to be removed prior to use of the actuator.

For storage periods from two to five years, spray electric contacts with CRC Lectra Shield spray coating or equivalent. This coating must be removed with a suitable cleaner--such as any petroleum solvent--prior to making electrical connections.

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5.0 INSPECTION WHILE IN STORAGE

While in storage, the control valve must be inspected regularly, as detailed below.

A. Inspection Schedule

Visually examine the exterior surfaces of the equipment on a semi-annual basis; visually examine accessible interior surfaces of the equipment on an annual basis.

Disassembly of the equipment is not intended or required during inspection--a satisfactory inspection can be performed while limiting any disassembly to removal of accessory covers and shipping caps.

B. Prevention of Contamination

Water, dirt, oil, grease, or other foreign material should be removed from the equipment. The source of these contaminants should be found and action should be taken to prevent recurrences.

C. Inspection of Desiccants

Equipment stored with desiccants is to be inspected to confirm that the desiccant material is being replaced every three months and is properly located and secured in the equipment.

D. Inspection of Covers, Caps and Plugs

Inspect all equipment covers and temporary shipping caps and plugs to make sure these items are firmly attached and will prevent the entrance of foreign matter into the valve and accessories.

6.0 FOLLOWING STORAGE

If the valve has been in storage, the following steps (as applicable) should be performed before the valve is installed.

A. Replacement of Packing, Seals, Gaskets, O-Rings and Diaphragm

Copes-Vulcan recommends replacing the packing if the valve has been stored for a period longer than a year and a half.

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Seals, gaskets, o-rings and diaphragms should be replaced if the valve has been stored for a period longer than three years.

B. Removal of Coating on Electric Contacts on Motor Operators

On motor operators, if the electric contacts have been treated with CRC Lectra Shield spray coating or equivalent, the coating must be removed with a suitable cleaner--such as any petroleum solvent--prior to making electrical connections.

C. Removal of Shipping Caps, Plugs, Covers and Desiccant Bags

When readying the valve for installation, check to make sure that all temporary shipping caps, plugs, covers and desiccant bags have been removed.

D. Copes-Vulcan Assistance After Long-Term Storage

If the storage period has exceeded three years, consideration should be given to hiring a Copes-Vulcan Service Engineer to inspect the valve before installation.

7.0 LOCATING THE CONTROL VALVE

Care should be taken in selecting the location for the control valve in the pipeline. The following points should be considered.

A. Access for Maintenance

Valves should be installed in locations where they can be conveniently and safely operated and maintained. In selecting the position for the valve, it is advisable to check for the availability of convenient points for installation of lifting hoists so the actuator and valve components can be removed.

B. Configuration of Associated Pipe

For efficient operation of the control valve, the associated pipe configuration must be taken into account. Failure to do so could adversely affect the capacity or the flow control performance of the valve.

Valves should be installed with a minimum of ten straight pipe diameters upstream of the valve and five straight pipe diameters downstream before going into a pipe bend. Ideally, there should be no other valves or fittings in these lengths of straight piping.

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When considering the pipe installation, care should be taken in locating T-pieces on the upstream and downstream side of the control valve as these can generate shockwaves that can filter back to the valve and adversely affect its performance.

C. Installation of Isolating Valves

If it is essential to install isolating valves adjacent to the control valve, these valves should be of the same bore as the control valve so to avoid the generation of a nozzle discharge effect into the control valve inlet, which can adversely affect the stability and performance of the control valve.

D. Pipe Size

It is not considered good practice to install valves into pipe that is more than two sizes larger than the valve size, but if doing so is necessary to achieve reasonable velocities in the piping, consider a two-stage expansion of the pipe with a short recovery distance between the two expanders.

E. Actuator Mounting

Wherever possible, install the valve with the actuator mounted vertically above the valve. If it is necessary to install the actuator in any other plane, consult Copes-Vulcan.

F. Pipe Supports

Pipe supports should be located in the vicinity of the valve in order to support the valve weight and to absorb any pipe loads. Except when mounting a large actuator in other than the vertical plane, no supports should be attached to the valve actuator.

G. Fluid Velocity Limitation

Consideration should be given to the velocity of fluid through the pipeline. If noise is a concern, Copes-Vulcan recommends that the exit velocity of the valve fluid not exceed one-third sonic for gas or steam applications.

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8.0 INSTALLATION

Care taken during the installation of a control valve will provide substantial benefits in terms of trouble-free service. The most common causes of problems with control valves are a result of incorrect installation, transference of pipe stresses to the valve body, or ingress of foreign matter into the valve trim, which causes the valve to stick and damages the valve trim.

A. Direction of Flow Through the Body

Make sure the valve is installed so the direction of the flow through the valve body will be correct. The inlet side of the control valve is marked "INLET".

B. Connecting Piping

The valve should be properly aligned and the connecting piping should be adequately supported so that no pipe strain is imposed on the valve body as this may cause distortion, which may lead to operational problems.

Avoid locating the control valve at a point where large end loads may occur.

Make sure the flanges on the connecting pipes are square and true with the valve.

When making screwed connections, the pipe threads must be clean and sharp. Use thread compound on the male thread only.

On butt-welded ends, make sure there is no offset between the pipe and valve end before welding.

C. Cleaning the Piping Before Installation

Before final connection of the valve to the pipe, the piping must be thoroughly cleaned and checked to make sure it is free of foreign matter.

D. Weld-End Valves

If the valve is to be welded into the line, care must be taken to ensure that excessive temperatures are not imparted to the valve components.

Valves that are welded into pipelines with the trim installed should be positioned at mid-stroke during welding/post-weld heat-treatment operations.

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Welding typically involves pre-heating, welding, and post-weld heat-treatment (stress-relieving).

Pre-Heating Precautions

Temperatures during pre-heating are usually in the range of 300 to 500°F (150 to 260°C), which will not impact metal parts, but can be damaging to elastomeric parts (i.e., o-rings, seal rings, PTFE packing, and gaskets), which have lower temperature limits. Since, however, the bonnet is unlikely to see the full effect of the pre-heat temperature, removal of the gaskets and packing is not necessary except when using low-temperature packing (PTFE).

Consideration should be given to removing the valve trim prior to pre-heating if the trim incorporates a soft seat or a ‘U’ cup elastomer seal used for balancing when the body temperature will exceed 450°F (232°C).

Inter-Pass Temperature Concerns

During the actual welding process, a good deal of heat can be generated. If the inter-pass temperature cannot be controlled to between 300 to 450°F (150 to 232°C), the guidelines under “Pre-Heating Precautions” apply.

Post-Weld Heat-Treatment Precautions

Post-weld heat-treatment is a cause for concern, as temperatures typically can reach 1400°F (760°C) and these temperatures may be held for several hours. Although the heat is applied locally to the valve ends, it is also conducted back into the valve body.

If post-weld heat-treatment is to be performed, remove all soft-seat trims or balanced single-seat trims using flexible ‘U’ cup elastomer seals. In addition, if the body temperature cannot be controlled to below 850°F (450°C), all trim parts should be removed.

Under no circumstances should the whole body be wrapped during heat-treatment with the trim installed.

Copes-Vulcan recommends that the valve bowl temperature be monitored at all times.

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E. Precautions for Pipeline Flushing

Flushing, which is used to remove solid particles from the piping system, can lead to problems with the control valve. The flushed particles can get trapped in the valve trim, where they may score the components, damage the valve seats, and cause the valve to stick.

If flushing is to be carried out with the valve in line, it is recommended that the valve trim be removed and replaced with a special set of flushing trim or stuffing box plug. Copes-Vulcan can supply special flushing trim that can be used during flushing and chemical cleaning. This trim normally consists of a temporary stem and cage.

F. Precautions for Chemical Cleaning

Chemical cleaning of pipeline can cause problems similar to those encountered after pipeline flushing, especially if the cleaning solutions are not neutralized after cleaning is complete and are allowed to remain in the valve body. Some acids will etch seating or gasket surfaces or may attack other parts of the valve trim. Copes-Vulcan strongly recommends that the valve trim be removed prior to chemical cleaning and replaced with a special set of flushing trim or stuffing box plug. Consult Copes-Vulcan if a set of flushing trim is needed.

G. Replacement of Packing and Gaskets

If the valve is disassembled for welding, heat-treatment or cleaning, an extra set of packing and gaskets must be on hand, as these parts may not be reused.

H. Air Connections to Pneumatic Actuators

When making air connections to pneumatic actuators, use only brass or stainless steel fittings. Make sure the tubing has been correctly deburred and blown clean before final connections are made.